microbial biotechnology

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Web alert

Nitrogen fixation in microbial biotechnology

An annotated selection of World Wide Web sites relevant to the topics in microbial biotechnology

Nitrogen fixation by legumes

http://www.csun.edu/~hcbio027/biotechnology/lec10/lindemann.html

This review provides a good overview of biological nitrogen fixation in the growth of leguminous plants, particularly relating to fertilizer needs for crops.

Nitrogen fixation in non-legume plants

http://aob.oxfordjournals.org/content/early/2013/03/08/aob.mct048.full

In addition to plants that form nodules that host nitrogen-fixing bacteria, other bacteria form different associations with plants, and this is currently under intense study to determine if there is significant nitrogen transfer to the plants.

Leaf bacteria fertilize trees

http://www.sciencemag.org/content/348/6237/844.summary

It is being proposed that one of the fastest growing trees, poplar, uses nitrogen-fixing bacteria to help them grow more quickly. The report also mentions the potential for bacterial nitrogen-fixers to support the growth of certain evergreen trees.

Nitrogen fixation in cereal crops

http://www.producer.com/2014/04/the-search-for-the-holy-grail-nitrogen-fixation-in-cereal-crops/

This article discusses efforts to effectively use microbial nitrogen fixation to boost the growth of cereal crops and require a lesser use of fertilizer, a development that would have very important implications for society.

Engineering nitrogen fixation in *Escherichia coli*

https://www.jic.ac.uk/news/2014/10/progress-towards-sustainable-biological-nitrogen-fixation/

This article reports on a research paper describing the expression of the iron-dependent nitrogen fixation enzymes in *E. coli*.

Origin of biological nitrogen fixation pushed back one billion years

http://www.oregonlive.com/pacific-northwest-news/index.ssf/2015/02/earlier_life.html

This article presents isotope evidence that biological nitrogen fixation by the molybdenum nitrogenase originated approximately 3.2 billion years ago.

Microbial nitrogen-fixers feed grasses

http://cafnrnews.com/2015/06/taking-root/

This news article discusses research demonstrating that a grass receives its total nitrogen needs from bacteria associated with the root surfaces.

Microbial nitrogen-fixation genes engineered into plant organelles

https://jwafs.mit.edu/research/projects/2015/engineered-nitrogen-fixation-expression-plant-organelles

This page describes a currently-funded research project to clone and express a re-engineered nitrogen fixation operon from a bacterium into plants.

Microbial Biotechnology (2015) **8**(5), 896–897
doi:10.1111/1751-7915.12313

Has a start-up solved the nitrogen problem?

http://www.agweb.com/article/has-a-startup-solved-agricultures-nitrogen-puzzle-NAA-chris-bennett/

This article describes the use of a nitrogen-fixing bacterium, *Gluconacetobacter diazotrophicus*, in a product that is being applied in field trials on oilseed rape, wheat and pasture grass.

Nitrogen fertilizer damages plant–microbe mutualism

http://www.laboratoryequipment.com/news/2015/02/nitrogen-fertilizer-slowly-damages-plant-microbe-mutualisms

The main message of this news article is the idea that exposure of rhizobia bacteria to nitrogen fertilizer over some years results in their nitrogen-fixing ability becoming less beneficial to leguminous plants.

Bacteria tracked feeding nitrogen to plants

https://www.bnl.gov/newsroom/news.php?a=25582

This news article points out the efficacy of using nitrogen-fixing bacteria to stimulate the growth of grasses and that these organisms are sold as crop inoculants in South America.

BBC: Nitrogen fixing

http://www.bbc.co.uk/programmes/b03k21p5

This video provides a good overview of nitrogen fixation by chemical and biological means.

New developments in biological nitrogen fixation

http://news.nationalgeographic.com/news/2014/09/140918-soil-bacteria-microbe-farming-technology-ngfood/

This article describes recent research on biological nitrogen fixation and new findings that non-leguminous crops can obtain significant nitrogen from bacterial nitrogen fixation.

Ceres: Nitrogen fixation products in biotechnology

http://www.ceresorganics.in/products/biotechnology-based.html

Ceres is a commercial entity that sells various formulations of nitrogen-fixing microbial fertilizer mixtures.

Non-symbiotic nitrogen fixation

http://www.biocyclopedia.com/index/biotechnology/plant_biotechnology/biological_nitrogen_fixation/biotech_non-symbiotic_n2_fixation.php

The Biocyclopedia lists many non-symbiotic nitrogen-fixing bacteria and contains links to other relevant information.

Free-living bacteria increase soil nitrogen

http://www.clw.csiro.au/publications/farming_ahead/2006/KYM_NSNF%20final_%20FEB_2006.pdf

This web brochure describes the contribution of non-leguminous nitrogen fixation to agriculture in Australia.

Lawrence P. Wackett
McKnight Professor
Department of Biochemistry
Molecular Biology and Biophysics
BioTechnology Institute
University of Minnesota
St. Paul, MN 55108, USA

